

# IMPROVED MICRO-NEEDLES AND METHODS OF MANUFACTURE AND USE THEREOF

## ABSTRACT OF THE DISCLOSURE

[0074] A micro-needle is provided which is particularly useful for the minimally invasive sampling of a biological fluid and/or the minimally invasive delivery of a drug or other formulation across the skin. The micro-needle has a structure having a base at a proximal end and a vertex at a distal end, and an open lumen extending there through and through which fluid may be transferred. The structure defines a structural axis that intersects the luminal axis defined by the open lumen. The point of intersection between these axes is at a point below the vertex of the micro-needle to provide a sharp apex at the distal end of the micro-needle and defines the general configuration of the distal end of the micro-needle, which may be selected or customized depending on the intended use of the microneedle. The micro-needle may be integral with a measurement device for measuring the concentration of a constituent within sampled biological fluid and/or with a fluid reservoir for containing a fluid to be delivered, and may also be used in conjunction with a remote control means. Methods of making and using the micro-needle of the present invention as well as kits comprising one or more of the micro-needles are also provided.